

M. Bigourdan says he first perceived the comet on June 22 at 13h. 30m. The following elements are deduced from the observation at Kiel (where the comet was seen two hours earlier than at Paris) on June 22, and the two following at Paris :—

1881.	Paris Mean Time.	Apparent Right Ascension.	Apparent Declination.
	h. m. s.	h. m. s.	
June 24 ...	9 51 26°0	5 38 21'84	+49° 5 31'6
26 ...	10 46 5'8	5 47 22'66	+56° 50' 2'4

Perihelion passage, 1881, June 16<sup>th</sup> 52806

$$\begin{aligned} \omega &= 265 22' 59'' \\ \Omega &= 270 57' 51'' \\ i &= 63 26' 51'' \end{aligned} \quad \text{Mean equin. 1881'0.}$$

log.  $g = 1.866099$

Representation of mean observation

$$\begin{aligned} \text{In longitude} &\dots \dots (o - C) \cos \beta = -7''7 \\ \text{In latitude} &\dots \dots o - C = -4''3 \end{aligned}$$

The last elements obtained by Bessel for the great comet of 1807 are as follows :—

Perihelion passage, 1807, September 18°74537 mean Paris time.

$$\begin{aligned} \omega &= 270 54' 42'' \\ \Omega &= 266 47' 11'' \\ i &= 63 10' 28'' \end{aligned} \quad \text{Mean equin. 1807.}$$

log.  $g = 1.810,3158$   
 $e = 0.995,4878$

With regard to the physical constitution of the comet, M. Wolf points out that while Coggia's comet (1874)—the only large comet visible on the horizon of Paris since spectrum analysis came into use—was at first telescopic, developed rapidly, and disappeared at the most interesting stage, the present comet comes to us already very much developed after its passage through perihelion. The transformations of the nucleus and its envelopes are extremely rapid (as the drawings show). In the large telescope the segmentation of the head, which Bond found in Donati's comet, was distinctly visible on June 24 ; the smallest instruments did not show it.

"The new comet represents, then, the second period of development of one of these curious stars, of which we have the first only in Coggia's comet. Its study enables us to follow the transformations of the envelopes, and to complete what information the comet of 1874 supplied.

"From the standpoint of spectrum analysis we may now correct a premature conclusion which might be deduced from our observations of Coggia's comet in 1874. That comet, from May 19, presented the continuous and nearly linear spectrum of the nucleus, traversed by the three bright bands characteristic of the light of comets (which I have found in more than a dozen of these stars). But on July 13, the evening of the last observation possible, the three bands had nearly disappeared, while the spectrum of the nucleus was become much brighter.

"Must we therefore conclude that the incandescent gas, carburetted hydrogen or other, to which these bands are due, disappear as the comet is developed, giving place to the light, proper or borrowed, of the nucleus? The observation of the new comet elucidates this. It rises rapidly from the horizon, in the same region of the sky where Coggia's comet descended to disappear, too quickly, below the horizon. Now on June 24 its spectrum, observed with the same instrument as was used in 1874, was reduced nearly to a continuous ribbon given by the nucleus; the nebulosity only gave a broad and very pale band, well terminated on the more refrangible side, diffuse on the other; the other bands of comets did not exist, or at least one could only suspect their existence in the neighbourhood of the nucleus. But yesterday (June 26) the comet was already far from the horizon, and when the sky was pure the three bright bands appeared with great distinctness. The green band especially was bright, longer than the two others, and dis-

tinctly limited on the less refrangible side (wave-length 516). On this side it seemed bordered by a dark space, as in the spectrum of Coggia's comet. As in the latter the red is the only colour pretty visible in the spectrum of the nucleus, and it is slightly dilated. The ulterior observations will show whether these bands will continue to develop. We are put on our guard, in any case, against the effect resulting from difference of altitude of the comet.

"The total quantity of light given by the head of the comet is considerable, and many persons have tried to compare it to a star of the first magnitude. In reality its intrinsic brightness is very slight. I had occasion last night, by slightly displacing the telescope, to look at the spectrum of a star of fifth or sixth magnitude; the line of light produced was at least as bright as the spectrum of the nucleus."

Admiral Mouchez having put at M. Thollon's disposal the 14-in. equatorial of the Observatory, the latter made some spectroscopic observations of the comet on the nights of June 24, 25, and 26, with the following results :—

"The nucleus of the comet gives a pretty bright continuous spectrum, on which one can distinguish neither bands nor lines. The nebulosity surrounding the nucleus gives three bands which are detached on a continuous spectrum. One of them is very visible; the others are faint. Their position has been measured with great care. The measurements, repeated a large number of times, are more concordant than I could have hoped.

"The spectrum of bands furnished by the comet so resembles that given by the blue spirit flame that I consider them identical. This identity does not result merely from the aspect of the bands and their ratios of intensity, but also from their absolute position. The spectrum of the comet is, then, the spectrum of carbon or of one of its compounds. The sole difference I have met with is that the violet band given by alcohol is not seen in the spectrum of the comet; the absorption of the atmosphere suffices to account for this difference." M. Thollon is making further observations.

#### NOTES

THE "Chelini-Memorial" volume takes the form of "Collectanea Mathematica," and is issued under the joint editorship of Professors Cremona and Beltrami (U. Hoepli, Milan). It contains thirty papers by twenty-eight sufficiently representative mathematicians, of whom sixteen are well-known Italian writers; of the remaining twelve, five (MM. Geiser, Kronecker, Reye, Schlafli, and Wolf) write in German, four (MM. Borchardt, Darboux, Hermite, and Mannheim) write in French. Of the three English contributors, Messrs. Cayley (on a differential equation), Hirst (on the complexes generated by two correlative planes) write in English, and Prof. H. J. S. Smith discourses in Latin "de fractionibus quibusdam continuis." There is a likeness of Chelini.

THE Government have appointed the Earl of Crawford and Balcarres Chief Commissioner, and Sir Charles T. Bright, Prof. D. E. Hughes, F.R.S., and Lieut.-Col. C. E. Webber, R.E., as Commissioners at the forthcoming Electrical Exhibition and Congress at Paris.

STUDENTS of Cretaceous geology will regret to hear that Griffiths, the well-known "fossil man" of Folkestone, has been disabled for many months by rheumatism, brought on by constant exposure during the past twenty-five years, in which he has daily extracted from the wet and slippery tract of Gault clay in East-weir Bay the remarkable series of mollusca with their pearly nacre preserved, plants, corals, crustacea, and reptilian remains that ornament not only the private collection of those who make

the Gault a subject of special study, but the national museums both of this country and of the New World. In addition to collecting by far the most perfect specimens of the Gault fauna and flora hitherto obtained, Griffiths has rendered an important service to science in carefully noting the bed or horizon from which each specimen was procured, which identification has formed the groundwork of the divisions which English geologists have been able to make in the Gault, and the correlation of these zones by M. Barrois and others with deposits occurring on the Continent. In consideration of these results, carried out by a working man under the difficulties of a struggle for life with circumstances, and the rigorous weather of the English Channel coast, it has been thought advisable to appeal to English geologists to raise a small fund which should render it unnecessary for work to be carried on when dangerous to health, and to tide him over present difficulties; towards this end a committee has been formed, consisting of Mr. W. Topley, F.G.S., Mr. F. G. H. Price, F.G.S., Prof. Boyd Dawkins, M.A., F.R.S., and Mr. C. E. De Rance, F.G.S., with Mr. F. G. H. Price of Messrs. Childs' Bank, Temple Bar, as treasurer, who will gladly receive subscriptions.

ACCORDING to annual custom, the specimens added to the Museum of the College of Surgeons are now exhibited in the Council Room of the College, and will remain for inspection until the 13th inst., when they will be distributed in their proper places in the Museum. The number of additions, both to the Pathological and Physiological series, appears to be unusually large. Among the former we notice a novel feature in a collection illustrating vegetable pathology and teratology, prepared by Mr. S. S. Thattock; also a fine series showing the characteristic lesions produced by Indian dysentery, presented by Sir Joseph Fayrer. To the physiological, or rather zootomical, series the inhabitants of the Zoological Society's Gardens have yielded their usual quota of mortal remains, and almost every portion of the internal anatomy of the manatee, the external appearance of which was so familiar, during seventeen months, to the visitors of the Brighton Aquarium, can now be seen, neatly dissected and displayed in spirit. There are also some very beautiful preparations of human anatomy. Among the most striking objects shown in the osteological collection are a magnificent skull of a sea-elephant and a fine articulated skeleton of a sealion, both of which were obtained for the museum by the secretary to the Falkland Islands Company, Mr. F. Coleman. A series of skulls and skeletons of Veddas, the aboriginal inhabitants of Ceylon, have been contributed by Mr. W. R. Kynsey. It is mentioned in Prof. Flower's report that the whole of the Barnard Davis collection, which numbers 1630 specimens, mostly crania, have been cleaned, arranged in the museum, and re catalogued during the year, and are now available for study. The report also refers to the appointment of an additional assistant curator, having special duties in the pathological department of the museum.

THE Anniversary Meeting of the Sanitary Institute of Great Britain will be held at the Royal Institution, Albemarle Street, on Thursday, July 14, at 3 p.m. An address will be delivered by the Chairman of Council, Prof. S. F. B. F. De Chaumont, M.D., F.R.S., entitled, "Modern Sanitary Science;" and the medals and certificates awarded to the successful exhibitors at the Exhibition at Exeter in 1880 will be presented.

AT a meeting of the joint committee of the Edinburgh Town Council, the Highland Society, and the Scotch Fisheries Improvement Association, held in Edinburgh on the 29th ult., a strong opinion was expressed in favour of the proposal to hold a Fisheries Exhibition in Edinburgh, of making it an international exhibition open to all countries, and of having it, if possible, in the Waverley Market, in April next year. An Executive Committee was appointed.

THE University College, Nottingham, was opened on Thursday last, July 30, by His Royal Highness the Duke of Albany, in a brief ceremony. At a luncheon afterwards, given in the Albert Hall, the Duke made a thoughtful speech on the nature and aims of the Institution. We hope to return to the subject.

BELGIUM (according to *L'Électricité*) will take a considerable share in the forthcoming Paris Exhibition. The number of exhibitors is over a hundred. Among other exhibits the Jaspar regulator and the *lampe-soleil* of MM. Clerc and Bureau will compete prominently with the numerous other systems of electric lighting. Of telephone-specialists M. de Locht-Labey will show his pan-telephone in action, and M. Navez's researches will doubtless receive due attention. Meteorological instruments will be specially represented by those of M. Van Rysselberghe, with which the indications of a meteorograph at a distance are registered directly at Brussels Observatory. Col. Leboulangé will exhibit ballistic apparatus of special type, and his ingenious dromometer and dromoscope for controlling the velocity of trains, especially at dangerous points. Various kinds of telegraph wire will be shown, and a special interest will attach to the wires of phosphor bronze from the works of M. Monte-fiore Lévy; these wires have a conductivity four times that of iron, and their tenacity being also much greater, lines may be made in which the wire section is greatly reduced. An official and special catalogue is being prepared for the Belgian section it will comprise an introductory notice by M. Bonneux on electrical science and industry in that country.

A PRIVATE visit was paid on Saturday last to the Channel tunnel experimental works by Sir E. Watkin, M.P. (chairman of the South-Eastern Railway Company), and a large party of scientific and other gentlemen. Very satisfactory progress was found to have been made at Abbot's Cliff since the last visit. The heading has now been advanced a total length of nearly half a mile. The tunnel is kept well free of water, and a good average rate of work is maintained. The work at the new shaft at Shakespeare's Cliff promises to be even more satisfactory. A very superior boring machine is used, and a more powerful engine is being fitted up to drive it.

THE first general meeting of the Society of Chemical Industry was held on the 28th ult. in the hall of the Institute of Civil Engineers, Prof. Roscoe presiding. After the President's address papers were read on "Recent Legislation on Noxious Gases," by Mr. E. K. Muspratt; "The Brewing of Lager Beer," by Prof. C. Graham; and "Mechanical Furnaces," by Mr. James Mactear. This promising Society already numbers 300 members.

THE Council of the University of Dublin have nominated Valentine Ball, M.A., of the Geological Survey of India, to the Professorship of Geology in the University of Dublin; this nomination however requires to be confirmed by a vote of the Board of Trinity College, Dublin. There were seven candidates.

M. W. DE FONVILLE, editor of *L'Électricité*, and M. Lippmann, one of his contributors, made a balloon ascent on July 2, shortly after midnight. The descent took place near Rambouillet at a quarter past five, the distance traversed being 48 kilomètres. The balloonists carried with them a small Planté accumulator with a special safety electric lamp constructed by Trouvé, composed of a platinum wire inclosed in a glass tube. While the apparatus did not weigh more than 1 kilog. it gave sufficient light for reading the barometer and thermometer, and writing notes with accuracy. A special luminous compass for aéronauts will be constructed on this plan and sent to the Exhibition of Electricity.

THE number of Chinese in the United States is now proved by the census to be very much less than has been commonly sup-

posed. It is only 105,717 (California possessing 75,122). It is true that the numbers have nearly doubled within the last ten years, but even at that rate they are not of a nature to cause any alarm such as appears to have been felt in some quarters. In the Eastern States the Chinese element is quite inappreciable among the foreign elements of population; New York contains but 942, Massachusetts 256, Illinois 214, &c.

THE scheme, earnestly advocated by the late Sir Thomas Moncreiffe, for providing Perth and Perthshire with a satisfactory natural history museum is now being realised, a handsome building in the Scottish baronial style having been built in South Tay Street with the funds provided. The ground floor contains a lecture-room, library, and laboratory or work-room, and the museum occupies the upper part of the building. To the rear a piece of ground has been secured on which additions more than doubling the accommodation could be built, but meantime the ground is to be used as a garden, in which all the more notable Perthshire plants will be grown. Access from the building can be easily obtained to two much larger lecture-halls than that in the museum, if necessary. The museum is to be strictly confined to the natural history, botany, and geology of Perthshire, excepting a small type collection, and should the project be rightly carried out (by the Perthshire Society of Natural Science) one of the most interesting and valuable local collections should thus be formed. The cost of the building (which is described in the current number of the *Scottish Naturalist*) has been upwards of £1,700, all of which has been subscribed. A further amount is required for furnishing, &c., and for this end a bazaar is to be held about the end of the year.

THE Literary and Antiquarian Society of Perth propose an extension of their Museum in Perth, the only one hitherto existing in the county, by building, at an estimated cost of £3000, a hall behind the present museum, mainly to accommodate the zoological collection (which comprises some 800 vertebrate and 2000 invertebrate forms). It is designed to present in this room a gradational view of animal life. A bazaar in aid of the proposed extension will be held on October 5 and 7. Subscriptions and donations may be sent to Mr. D. Hepburn, solicitor, 12, Charlotte Street, Perth, or to Dr. Bower, R.N., Montreal College, Perth.

AT the concluding meeting of the session of the Geologists' Association on Friday, July 1, a costly timepiece and ornaments were presented to Mr. J. Logan Lobley with the following address:—"The accompanying timepiece and ornaments are presented by the members of the Geologists' Association of London to their treasurer, J. Logan Lobley, Esq., F.G.S., F.R.G.S., in recognition of the valuable services he has rendered to the Association as Honorary Secretary, 1871-74, and Honorary Editor, 1871-81, and of the active interest he has always taken in its welfare and progress."

A BRANCH of the Baturite railway in Brazil has a gradient, which is probably the steepest in the world worked with a locomotive acting by simple adherence. This gradient is about 10 per cent., or 90 to 100 millimetres per metre. The line (described in last week's *La Nature*) is of narrow gauge, and extends from the port of Alfandega on the Atlantic to the town of Fortaleza, about 2 kilometres distance. The locomotive is from the Baldwin works in the United States; it has an adherent weight of 20,000 kilograms, and draws three loaded goods waggons or a single passenger car of the American type at a velocity of 20 kilom. per hour. By always limiting the weight to be drawn to an amount considerably under that of the engine, the regularity of the service on this line has been ensured during the two years it has been in use.

THE first part of a fourth edition of Griffith and Henfrey's useful Micrographic Dictionary has appeared. It is expected

that the issue will be completed in twenty-one of these monthly parts, which will include important additions representing recent scientific progress. This work is known to aim especially at helping the microscopic observer to discover what any object is which may be presented to him, and by the aid of the Bibliography to refer to more extensive treatises for further details. A system is also adopted by which one is guided to a general knowledge of particular departments of science. There is an introduction on the use of the microscope. Dr. Griffith is assisted in the editing by the Rev. Mr. Berkeley and Prof. Rupert Jones.

WE have received an excellent specimen number of a new French engineering journal entitled *L'Ingénieur*. The proprietors have acquired the right of reproduction, in France, of articles from our contemporary, *Engineering*, of which articles the new paper will largely consist.

M. FERDINAND DE LESSEPS has been elected president of the Société de Géographie of Paris.

THERE was recently landed at Marseilles a magnificent zebra which the King of Choa, Menelick II., has sent as a present to the President of the French Republic. This zebra, called the *Semaphore*, has been brought from Abyssinia by two Marseillais. The Société de Géographie, to which it was addressed from Aden, has intrusted it to the Marseilles Zoological Garden.

THE evening *fête* of the Royal Horticultural Society was held on the 28th ult. in the Gardens at South Kensington. Coloured lamps were disposed about the lawns, and here and there the cool plash of fountains was to be heard. The Siemens and Maxim electric lights were placed in the upper part of the Gardens, and in the lower part were two tents illuminated by the Brush electric light, and containing the plants of a flower-show, which continued next day. Brilliant effects were obtained with coloured fires behind the trees and the spray of the fountains.

THE Berwickshire Naturalists' Club commemorated the fiftieth year of its existence on the 29th ult. by a meeting at Grant's House, largely attended by members. Excursions were made to different places of interest in the locality, and before dinner Mr. James Hardy, joint secretary, was presented with a valuable microscope and £10, in recognition of his long and arduous services. The Rev. Thomas Brown, Edinburgh, one of the oldest members of the club, presided.

FROM the *Colonies and India* we learn that the Meteorological Conference lately held at Sydney has agreed to a division of Australia into meteorological districts or aspects, to form the basis of weather telegrams and warnings. A cipher code has been arranged for weather telegrams to New Zealand, and the Queensland Government is to be asked to co-operate in the matter.

FROM an approximate summary of this year's census of Victoria, which has just been received from Mr. H. H. Hayter, the Government statistician, it appears that the total population of the colony, including Chinese and Aborigines, is now 855,796, against 731,528 in 1871. The Chinese number 11,796, and the aborigines 768, the former showing a decrease of 6299 and the latter of 562.

THE additions to the Zoological Society's Gardens during the past week include a Purple-faced Monkey (*Semnopithecus leucoprymnus*) from India, presented by Lieut. W. V. Anson, R.N.; a Daubenton's Curaçao (*Crax daubentonii*) from Venezuela, a Hawk-billed Turtle (*Chelone imbricata*) from the East Indies, presented by Capt. King; a Rough Terrapin (*Clemmys punctularia*) from Trinidad, presented by Mr. Lachmere Guppy; ten Green Turtles (*Chelone viridis*) from Ascension presented by

Messrs. Weil Brothers; two Yellow Snakes (*Chilobothrus ornatus*) from Jamaica, presented by Mr. Chas. B. Masse; a Squirrel Monkey (*Chrysotrix sciurea*) from Demerara, a Military Macaw (*Ara militaris*) from South America, deposited; a Wapiti Deer (*Cervus canadensis*), two Hybrid Paradoxures (between *Paradoxurus leucomystax* and *P. stigmaticus*), born in the Gardens.

#### GEOGRAPHICAL NOTES

THE Geographical Society's *Proceedings* this month are chiefly occupied with the anniversary meeting at the end of May, and everything said and done on that occasion seems to have been carefully recorded. The only paper given is that by Mr. Minchin on Eastern Bolivia and the Gran Chaco, and it is illustrated by one of the best maps which the Society has published for some time. The geographical notes supply intelligence of matters which have not hitherto attracted notice in this country, though one at least is of considerable importance. We allude to the recent exploration of the Beni River by Dr. Heath of Wisconsin, which is a distinct addition to our knowledge of the Amazons' system. When fuller details, including Dr. Heath's observations for latitude and longitude, have come to hand, it will be for the first time possible to fix the precise position of the mouth of the magnificent river, best known as the Madre de Dios, which, until a few years ago, was believed by geographers to be a feeder of the Purus instead of the Madeira. Some information is also given as to the progress of exploration between the Rovuma and Lake Nyassa.

M. ABBÉ DESGODINS, who is well known for the excellent geographical work he has done in Eastern Tibet, contributes to *Les Missions Catholiques* the first part of some interesting notes on the marriage and other domestic customs of the Tibetan.

IT may be interesting to mention that in last week's number of the Society of Arts' *Journal* some useful notes are published on gums, resins, and waxes, which Mr. C. G. Warnford Lock has compiled from the journals of recent travellers. Especial prominence is given to India-rubber and the curious fossil resin known as gum copal.

M. ROUX has been intrusted by the Minister of Public Instruction and Fine Arts at Paris with a scientific mission to Tunis, and he has already begun the exploration of the region near the Constantine province of Algeria. He will afterwards undertake topographical and botanical investigations in the country between the Mejerba Valley and Cape Bon peninsula. Under the auspices of the same department M. Lantz is engaged in making natural history collections in some of the unknown parts of Madagascar.

M. BOULANGER, a French Government engineer, has lately been engaged on a surveying expedition in Indo-China, in connection with the project for a railway. He went by a somewhat circuitous route from the frontier of French Cochin-China across Cambodia to Siam, made an especial study of the basin of the Tonlé-Sap, or Great Lake, which, according to his view, was formerly the head of the Gulf of Siam. The mountains south of Pursat must, therefore, have been an island, but the intervening low country becoming filled up they were joined to the mainland. As the result of his observations, M. Boulanger thinks that the Tonlé-sap will gradually silt up.

WE hear that Mr. Dorward, of the China Inland Mission, returned to Shanghai early in April from a five-months' journey in the province of Hunan. He is the only Protestant missionary who has ever traversed the route by which he returned from Hung-kiang to the neighbourhood of the Tung-ting Lake. Mr. Dorward also paid a flying visit to Kwei-yang-fu, the capital of the Kweichow province.

A PROMINENT paragraph in the *Standard* of last Saturday states that the "Geographical Society has received some interesting details of the fate of the Wybrants [i.e. Capt. Phipson-Wybrants] Expedition in Mozambique." We understand that there is absolutely no foundation for this statement, and the only effect of it is to inflict cruel disappointment on the relatives of the deceased members of this unfortunate expedition, regarding whose last days detailed particulars are anxiously awaited. Whether these will ever be known is, we fear, more than doubtful. The expedition was a purely private undertaking on the part of the late Capt. Phipson-Wybrants, and though he was aided with a loan

of instruments, he was in no sense sent out by the Geographical Society.

THE Brazilian Section of the Lisbon Geographical Society, which was established a short time back, has commenced the publication at Rio de Janeiro of a periodical under the title of *Revista Mensal*. Dr. F. Mendes de Almeida is the editor-in-chief.

THE Bengal Asiatic Society have issued as part of their *Journal* Mr. Longworth Dawes' sketch of the Northern Baluchi language, containing a grammar, vocabulary, and specimens of the language.

#### CIVILISATION AND BARBARISM IN SOUTH AFRICA

AT a meeting of the Anthropological Institute on the 28th ult. Sir Bartle Frere gave a lecture treating of the results of contact of civilised with uncivilised races in South Africa. The first part of the lecture dealt with the historical results of such contact in other countries, and the lecturer, after a sketch of the recent history and present condition of the various South African races, maintained that on the whole natives have increased in numbers as well as improved in physique and in intellectual status by contact with Europeans, and that there was also little real reason to doubt an improvement in moral status. The conditions required to raise and improve races like the Kafirs were (1) a strong imperial government; (2) freedom from slavery and equality before the law. To secure these two requisites it was necessary (3) to determine whether the standard of moral and social progress shall be that of the European or that of the native races; (4) education according to English standards. The general results arrived at in the lecture were summarised in the following propositions:—(1) It is possible for the civilised to destroy by war the savage races, to expel, or repel, or turn them aside in their migrations; (2) proximity of civilised and savage races has led or is leading to the decay and probable extinction of the Bushman race. But this result is doubtful in the case of the Hottentot races, and is certainly not taking place with regard to the Bantu or Kaffir races; (3) the changes consequent on proximity of civilised and uncivilised races are an approximation to the European type of civilisation; (4) the essentials to such approximation are (a) a pax Romana or Anglicana, bringing with it (b) protection of life and property, which involves equality before the law, individual property in land, abolition of slavery, abolition of private rights of making war and of carrying arms without the authority of the supreme ruler; (c) power of local legislation on European principles, with a view to secure education in the arts of civilised life, taxation sufficient for state purposes, restrictions on the use of intoxicating substances, as measures essential to the full attainment of any one of the preceding objects.

#### INDIGO AND ITS ARTIFICIAL PRODUCTION

MORE than eleven years ago the speaker had the pleasure of bringing before this audience a discovery in synthetic chemistry of great interest and importance, viz. that of the artificial production of alizarine, the colouring substance of madder. To-day it is his privilege to point out the attainment of another equally striking case of synthesis, viz., the artificial formation of indigo. In this last instance, as in the former case, the world is indebted to German science, although to different individuals, for these interesting results, the synthesis of indigo having been achieved by Prof. Adolf Baeyer, the worthy successor of the illustrious Liebig in the University of Munich. Here then we have another proof of the fact that the study of the most intricate problems of organic chemistry, and those which appear to many to be furthest removed from any practical application, are in reality capable of yielding results having an absolute value measured by hundreds of thousands of pounds.

In proof of this assertion, it is only necessary to mention that the value of the indigo imported into this country in the year 1879 reached the enormous sum of close on two millions sterling, whilst the total production of the world is assessed at twice that amount; so that if, as is certainly not impossible, artificial indigo can be prepared at a price which will compete with the native product a wide field is indeed open to its manufacturers.

Lecture delivered at the Royal Institution, Friday, May 27, 1881, by Prof. H. E. Roscoe, LL.D., F.R.S.